

IN THE CLAIMS

Please cancel Claims 2, 3, 7-9, 13, 14, 17-21, 31-38, 41-43 and 45 without prejudice.

New Claims 51-65 have been added.

Please amend Claims 1, 10-12, 16, 22-27, 30, 39, 40 and 44 to read as follows. A marked-up version showing the changes made hereto is attached.

Sub B2
Q1

1. (Amended) An image pickup apparatus comprising:
a plurality of image pickup elements which are formed on a same semiconductor substrate,
wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, and a scan circuit which supplies a common read-out pulse sequentially to a plurality of pixels arranged in a first direction, and
wherein said scan circuit is arranged between two photoelectric conversion units included in the same image pickup elements and is not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

2. (Cancelled)

3. (Cancelled)

4. (Not Currently Amended) An apparatus according to claim 1,
wherein said scan circuit comprises a shift register.

5. (Not Currently Amended) An apparatus according to claim 4,
wherein the shift register is of static type.

6. (Not Currently Amended) An apparatus according to claim 1,
wherein said scan circuit comprises a decoder.

7. (Cancelled)

8. (Cancelled)

9. (Cancelled)

10. (Amended) An apparatus according to claim 52, wherein said scan
circuit comprises vertical and horizontal scan circuits, and the vertical scan circuit is bent
so as not to cross the horizontal scan circuit.

11. (Amended) An apparatus according to claim 52, wherein said scan
circuit comprises vertical and horizontal scan circuits, and the horizontal scan circuit is
bent so as not to cross the vertical scan circuit.

B2
A 2
Cont

12. (Amended) An apparatus according to claim 1, wherein said scan circuit is arranged along a plurality of photoelectric conversion units arranged in a second direction, different from the first direction.

B2

13. (Cancelled)

14. (Cancelled)

15. (Not Currently Amended) An apparatus according to claim 1, wherein an electric power supply line is arranged on said scan circuit.

Sub B2
A 3

16. (Amended) An image pickup apparatus comprising:
a plurality of image pickup elements which are formed on a same semiconductor substrate,
wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, and a plurality of transfer switches which transfer signals from said plurality of pixels sequentially to a common output line, and
wherein each of said plurality of transfer switches is arranged between two photoelectric conversion units included in the same image pickup element and is not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

17. (Cancelled)

18. (Cancelled)

19. (Cancelled)

20. (Cancelled)

21. (Cancelled)

22. (Amended) An apparatus according to claim 16, wherein an electric power supply line is arranged on said plurality of transfer switches.

23. (Amended) An apparatus according to claim 1, further comprising a scintillator plate and fiber optic plate provided in front of said plurality of image pickup elements.

24. (Amended) An apparatus according to claim 16, further comprising a scintillator plate and fiber optic plate provided in front of said plurality of image pickup elements.

25. (Amended) An apparatus according to claim 23, further comprising:
a signal processing circuit adapted to process signals from said plurality of image pickup elements;
a recording circuit adapted to record a signal from said signal processing circuit;

a display circuit adapted to display the signal from said signal processing circuit; and

a radiation source adapted to generate radiation.

26. (Amended) An apparatus according to claim 24, further comprising:

a signal processing circuit adapted to process signals from said plurality of image pickup elements;

a recording circuit adapted to record a signal from said signal processing circuit;

a display circuit adapted to display the signal from said signal processing circuit; and

a radiation source adapted to generate radiation.

27. (Amended) An image pickup apparatus comprising:

a plurality of image pickup elements which are formed on a same semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, and a protection circuit, and

wherein said protection circuit is arranged between two photoelectric conversion units included in the same image pickup element and is not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

62
28. (Not Currently Amended) An apparatus according to claim 27,
wherein said protection circuit comprises a protection resistor.

29. (Not Currently Amended) An apparatus according to claim 27,
wherein said protection circuit comprises a protection diode.

95
30. (Amended) An apparatus according to claim 53, wherein said
external terminal has a bump.

62
31. (Cancelled)

32. (Cancelled)

33. (Cancelled)

34. (Cancelled)

35. (Cancelled)

36. (Cancelled)

37. (Cancelled)

38. (Cancelled)

sub B2
Q 6

39. (Amended) An apparatus according to claim 54, wherein said external terminal and said protection circuit are arranged side by side.

40. (Amended) An apparatus according to claim 54, wherein said external terminal and said protection circuit overlap each other.

B2

41. (Cancelled)

42. (Cancelled)

43. (Cancelled)

a 72
sub B2

44. (Amended) An apparatus according to claim 54, wherein a protection resistor is interposed between said external terminal and said protection circuit.

sub B2

45. (Cancelled)

46. (Not Currently Amended) An image pickup apparatus for dividing an object image into a plurality of regions to form one image, wherein external terminals which are connected to a wiring line sandwiched between boundary sides of first and second regions and are arranged in the first region, are not at the same positions in a direction along the boundary sides as external terminals which are connected to another wiring line sandwiched between the boundary sides and are arranged in the second region.

47. (Not Currently Amended) An apparatus according to claim 27,
further comprising a scintillator plate and a fiber optic plate.

48. (Not Currently Amended) An apparatus according to claim 46,
further comprising a scintillator plate and a fiber optic plate.

49. (Not Currently Amended) An apparatus according to claim 47,
further comprising:

a signal processing circuit adapted to process a signal from said
image pickup region;

a recording circuit adapted to record a signal from said signal
processing circuit;

a display circuit adapted to display the signal from said signal
processing circuit; and a radiation source adapted to generate radiation.

50. (Not Currently Amended) An apparatus according to claim 48,
further comprising:

a signal processing circuit adapted to process a signal from said
image pickup region;

a recording circuit adapted to record a signal from said signal
processing circuit;

a display circuit adapted to display the signal from said signal
processing circuit; and

a radiation source adapted to generate radiation.

Add new claims 51-65 to read as follows:

- 51. (New) An image pickup apparatus comprising:

a plurality of image pickup elements which are formed on a same semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, a plurality of transfer switches which transfer signals from said plurality of pixels sequentially to a common output line, and a scan circuit which supplies pulses sequentially to said plurality of transfer switches, and

wherein said scan circuit is arranged between two photoelectric conversion units included in the same image pickup elements and is not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

52. (New) An image pickup apparatus comprising:

a plurality of image pickup elements which are formed on a same semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are rearranged two-dimensionally, a vertical scan circuit which supplies a common read-out pulse to the pixels arranged in one direction, a plurality of transfer switches which transfer signals from said plurality of pixels sequentially to a common output line, and a horizontal scan circuit which supplies pulses sequentially to a common output line, and a horizontal scan circuit which supplies pulses sequentially to said plurality of transfer switches, and

wherein said vertical scan circuit and said horizontal scan circuit are arranged between two photoelectric conversion units included in the same image pickup element and are not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

53. (New) An image pickup apparatus comprising:

a plurality of image pickup elements which are formed on a same semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, and an external terminal, and

wherein said external terminal is arranged between two photoelectric conversion units included in the same image pickup element and is not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

54. (New) An image pickup apparatus comprising:

a plurality of image pickup elements which are formed on a same semiconductor substrate,

wherein each of said plurality of image pickup elements includes a plurality of pixels which include photoelectric conversion units respectively and are arranged two-dimensionally, a protection circuit and an external terminal, and

wherein said protection circuit and said external terminal are arranged between two photoelectric conversion units included in the same image pickup

element and are not arranged between the photoelectric conversion units arranged respectively at end portions of two image pickup elements adjacent to each other.

b2
55. (New) An apparatus according to Claim 51, further comprising a scintillator plate and a fiber optic plate, provided in front of said plurality of image pickup elements.

56. (New) An apparatus according to Claim 52, further comprising a scintillator plate and a fiber optic plate, provided in front of said plurality of image pickup elements.

57. (New) An apparatus according to Claim 53, further comprising a scintillator plate and fiber optic plate, provided in front of said plurality of image pickup elements.

af
58. (New) An apparatus according to Claim 54, further comprising a scintillator plate and a fiber optic plate, provided in front of said plurality of image pickup elements.

59. (New) An apparatus according to Claim 55, further comprising:
a signal processing circuit adapted to process signals from
said plurality of image pickup elements;
a recording circuit adapted to record a signal from said signal
processing circuit;
a display circuit adapted to display the signal from said

signal processing circuit; and

a radiation source adapted to generate radiation.

60. (New) An apparatus according to Claim 56, further comprising:

a signal processing circuit adapted to process signals from
said plurality of image pickup elements;

a recording circuit adapted to record a signal from said signal
processing circuit;

a display circuit adapted to display the signal from said
signal processing circuit; and

a radiation source adapted to generate radiation.

61. (New) An apparatus according to Claim 57, further comprising:

a signal processing circuit adapted to process signals from
said plurality of image pickup elements;

a recording circuit adapted to record a signal from said signal
processing circuit;

a display circuit adapted to display the signal from said
signal processing circuit; and

a radiation source adapted to generate radiation.

62. (New) An apparatus according to Claim 58, further comprising:

a signal processing circuit adapted to process signals from
said plurality of image pickup elements;